

ART GLASS INSPECTION GUIDANCE QUESTIONS

1. General Information

Facility Name _____

Facility Address _____

Facility Contact Name/Title _____

Facility Phone Number _____

2. Does the facility melt any materials that are not already glassified (metal oxides, sand, soda ash, etc) or a high metal oxide containing frit (cadmium frit or lead frit)? Note: If the facility uses partial cullet and partial other materials, that is still yes. If **No**, answer the following subquestions and conclude the inspection, if **Yes** go to the next section.

a. Describe the material used for the process (frit, glass bars, pillows, sheets) and the process involved in the design of the stained or colored glass (fusing, melting, etc.)?

b. How much of each material is used on a daily or weekly basis (lbs)?

c. How is the glass melted to work with? Describe the heat source and the temperatures involved. For how long and at what temperature is each piece of glass typically melted?

Glass Manufacturing Section

1. Describe the glass manufacturing process including receipt of raw materials, batch mixing, batch melting, coatings, annealing and any frit processing.
2. Describe the units (furnaces/kilns/pots) used to melt glass.
3. For melting units (referred to as furnaces but includes kilns and pots), provide the following:
 - a. The designation for the furnace.
 - b. The holding size of the furnace (lb).
 - c. Is the furnace a pot furnace (clay pot), a classic furnace (refractory rectangular shape with overfired direct heating) or a kiln (small ceramic lined vessel)?

- d. For furnaces which are not pots or kiln, answer the following:
 - i. Is glass manufactured on a continuous process or is glass added and removed with each batch?
 - ii. Is the furnace an air-gas or oxygen-gas? If the furnace is oxygen-gas, what date was it converted?
 - iii. Does the furnace have any heat recovery (recuperators or regenerators)? Describe.
 - e. When the furnace was originally constructed? Has the size, shape or operation (oxyfuel, electric, recuperative) been altered since original construction?
 - f. What is the general operating temperature of the furnace? What are the highest and lowest temperatures during a melt?
 - g. Where is the temperature in the furnace measured? Is it recorded?
 - h. Is the furnace empty regularly for more than 2 hours? If so, when and for how long? What temperature is the furnace kept at during these periods?
 - i. Obtain a schematic of the furnace with dimensions.
 - j. Obtain design information on the furnaces that includes holding capacity size and maximum glass flow in tons per hour or tons per year.
 - k. What is the refractory made out of for each furnace?
4. Describe the melting process at the facility including the time for batch charging, number of charges, cook time, labeling/emptying time, and reheat time. If it varies between furnaces describe for the different types.
 5. Describe the air pollutants emitted from the process.
 6. How much glass product is made per month and per year?
 7. Are any other metals (such as chromium, cadmium, arsenic, lead, manganese, or nickel) added to the process and, if so, which furnaces receive which metals? For each metal how much is used monthly and annually? Obtain inventory records if possible. Also obtain an MSDS for any metal used in the furnace.
 8. If chromium is added, is it hexavalent (chromates) or trivalent chromium (chromites)? This should be provided as an msds as well under #7.
 9. Where do the furnaces exhaust (roof stack, side building vent)?
 10. Are there any air emission controls on the dust handling from the raw materials, material unloading, batch mixing or frit processing? If so, review the dust capture system and get information on the baghouses in place and what process streams each baghouse receives. What is done with the dust collected from the baghouse? If it is melted, what is done with the vitrified product?
 11. Are there any air emission controls being used on the furnaces? For each unit, describe

- a. Type of unit (ESP, baghouse)
 - b. List of furnaces exhausted to the baghouse
 - c. Design, flow rate, and, for baghouses only, the type of bags.
 - d. Temperature of the exhaust in the unit
 - e. Parameters monitored and recorded?
 - f. Maintenance schedule for the unit.
 - g. Have there been any performance tests on the unit? If so provide all stack tests.
 - h. What is done with the waste from the baghouse?
 - i. Has any waste analysis been performed on baghouse dust from any of the furnaces and, if so, obtain a copy of the results.
12. Request batch tickets (or similar, like a charge record and formula) for each furnace for the last month.

Inspector Name _____

Date _____